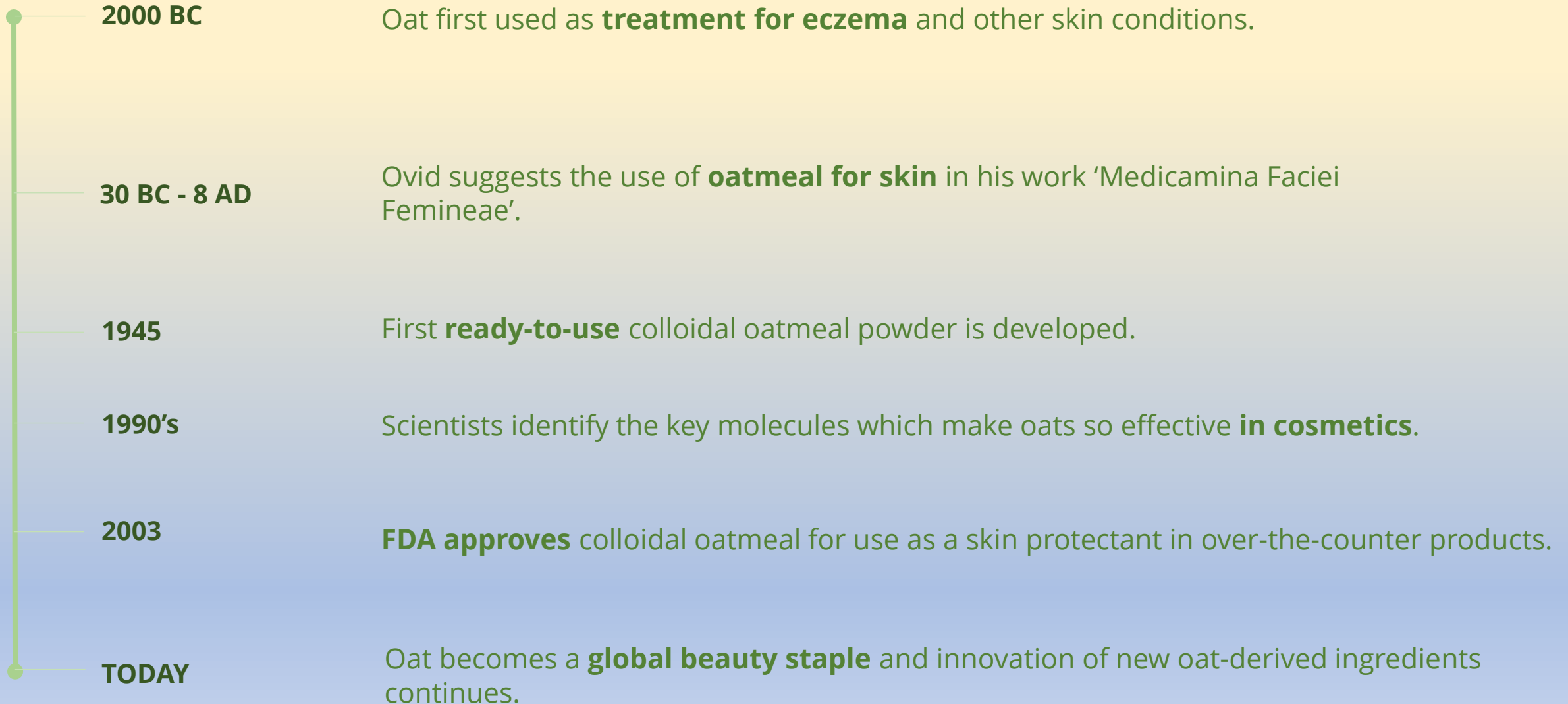




Oat Derived Ingredients in Beauty and Personal Care – a Sustainable, Natural Approach

Why Oats?

The History of Oats as a Cosmetic and Pharma Ingredient



The Oat Harvest

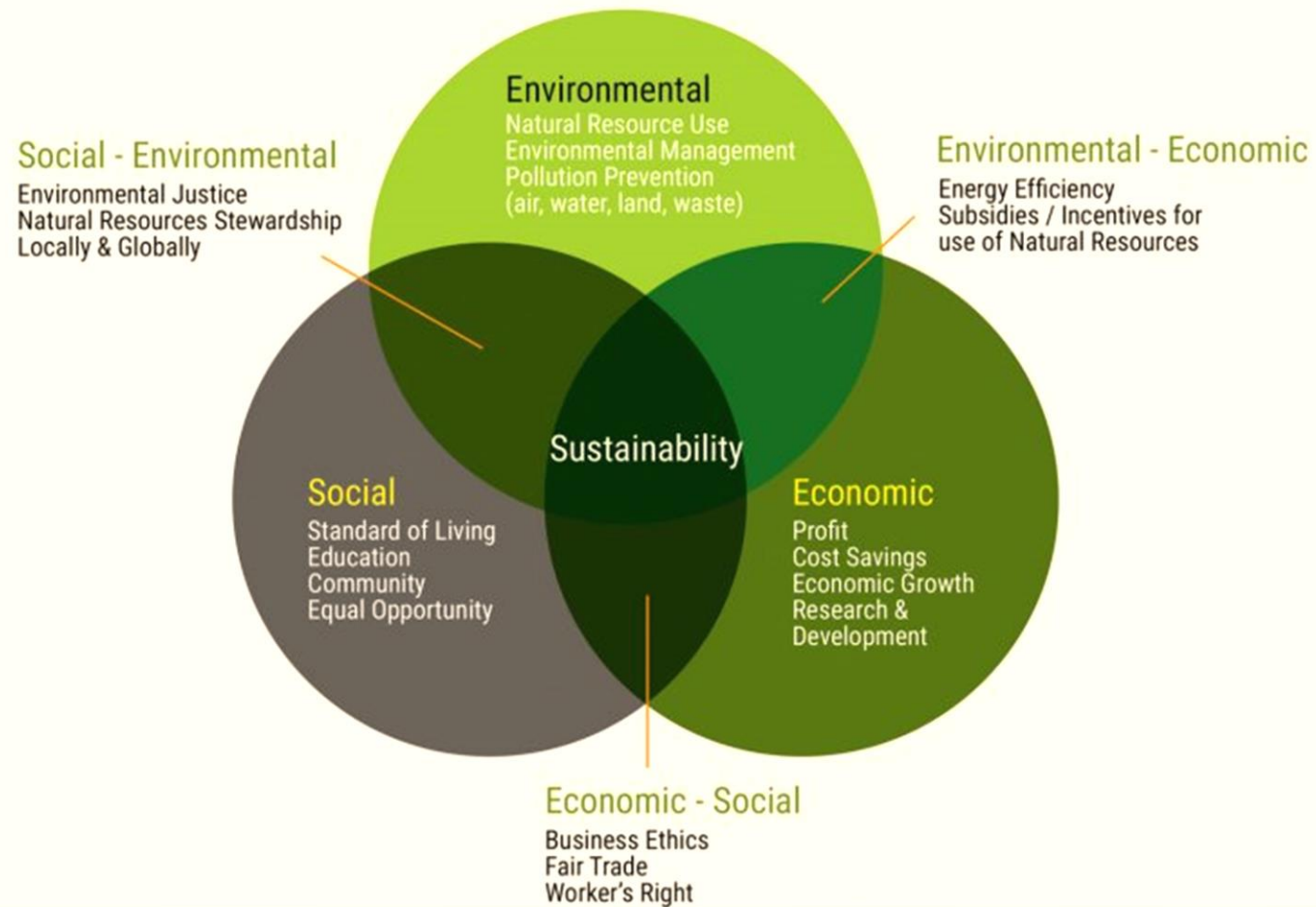
Field to Face



Why Oats? A Sustainable Crop



THE THREE SPHERES OF SUSTAINABILITY



Why Oats?

A Sustainable Crop - Environmental



Avoiding Water Contamination

Strong inherent disease resistance means oats require minimal use of herbicides and insecticides, preventing surface and ground water contamination



High Yields

Complex genome understanding allows the planned selection of new varieties which are best adapted to specific conditions, ensuring that farmers get the best yields possible



Nutrient Efficient Crop

Compared to other crops, oats extract fewer major nutrients, nitrogen, potash, phosphates and trace elements from the soil, reducing the need for fertiliser



Less Water Usage

Oats require far less water than other crops, avoiding depletion of underground water sources which can otherwise occur as result of crop irrigation



Less Waste

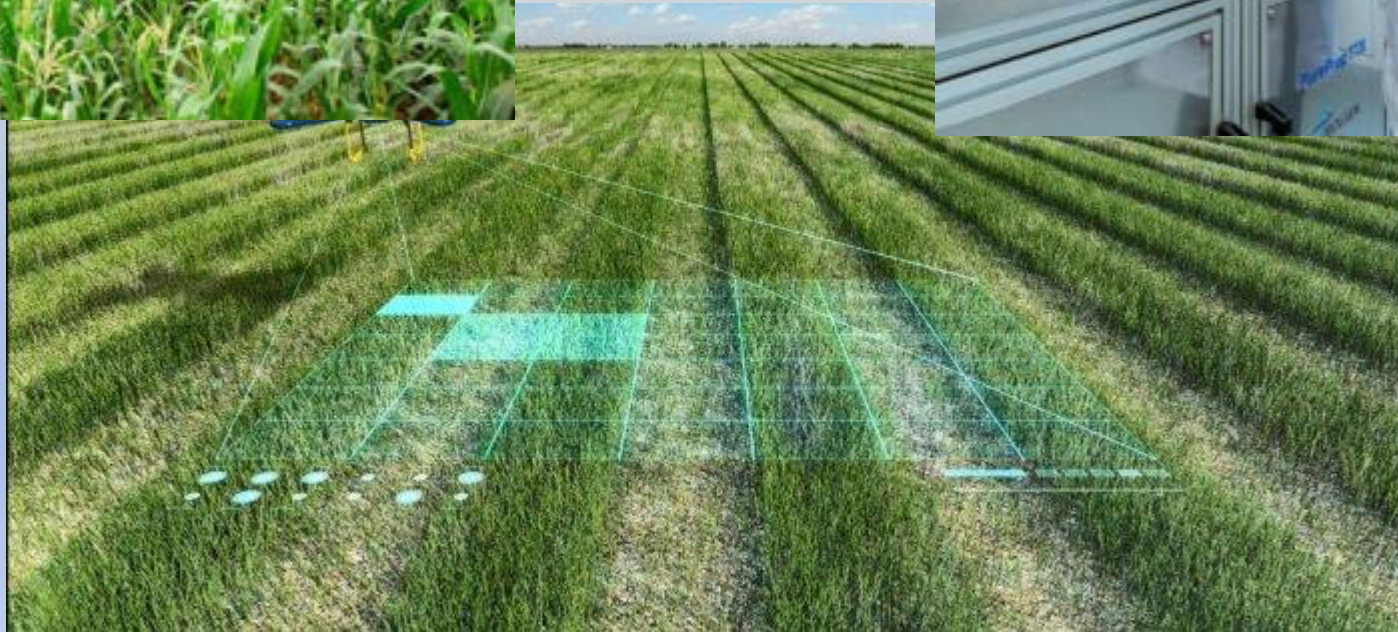
Breeders are able to breed for selected characteristics such as high beta glucan, lipid and avenanthramide content, avoiding unwanted waste crop



Why Oats? A Sustainable Crop - Social



Why Oats? A Sustainable Crop - Economic

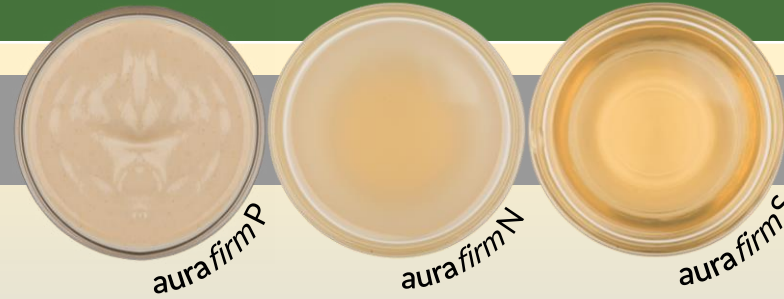


Why Oats?

Sustainable Processes Example 1



Sustainable Ingredients: *aura firm*



Stage 1

Our Finnish Oat Farms

Supporting Rural Communities

Agriculture is the backbone of rural populations in Northern Finland

Cross-Industry Collaboration

Surplus oat grain and processing by-products are given to livestock farms and oat farms receive manure as fertiliser in return

Minimising Water Pollution

Heavy metal concentrations and pesticide residue levels are carefully monitored and kept extremely low, minimising run-off to water courses

Renewable Energy

Solar power is used across the farming process to reduce reliance on non-renewable energy sources



Stage 2

Oat COM Processing

Low Energy Process

Oat COM's patented manufacturing process eliminates the need for chemical disinfection, avoiding chemical waste streams or energy-intensive heat treatment, and utilises a low energy extruder

Stage 3

Fermentation (Oat COM to *aura firm*)

No Waste

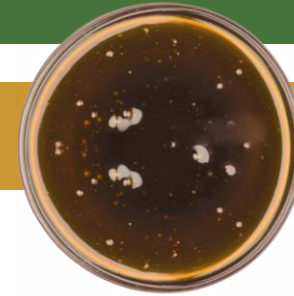
No waste product is produced following fermentation as all resulting parts are used in the *aurafirm* range

Why Oats?

Sustainable Processes Example 2



Sustainable Ingredients: AvenaPLex



Stage 1 Our Swedish Oat Farms

Reduced Nutrient Leakage

Latest camera technology is employed to determine crop's need for fertilisers and pesticides to the square centimetre, minimising soil and water pollution

Fossil-Free Transport

Renewable energy is used to power vehicle fleets and tractors

Respecting Biodiversity

Farmers are required to leave some areas in fields unsown to allow birds to land and feed

Sustainable Government Initiatives

It is government policy in Sweden that the agricultural landscape be protected while working to preserve biodiversity. National environmental objectives, such as reducing pesticide and fertiliser use, are now in place

Stage 2 AvenaPLex Processing

Use of By-Products

Derived from a by-product of the food industry that has highly desirable properties for cosmetic use and would otherwise be disposed of

Sustainably-Sourced Ethanol

The extraction process uses corn-based ethanol, reducing the burden on non-renewable resources from which ethanol is often derived



Why Oats? Certified Ingredients



● Production and processing practices that respect the environment and human health	✓
● Development of the green chemistry concept	✓
● Absence of petrochemical ingredients	✓
● Absence of GMOs	✓
● Absence of animal origin ingredient	✓
● Responsible use of natural resources & biodiversity conservation	✓

ISO16128 (NATURAL INDEX = 1*)

● 100% natural ingredient	✓
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Ingredients' countries of origin are parties in **The Nagoya Protocol**

We only use **cultivated oats** and not any plants which are protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (**CITES**).

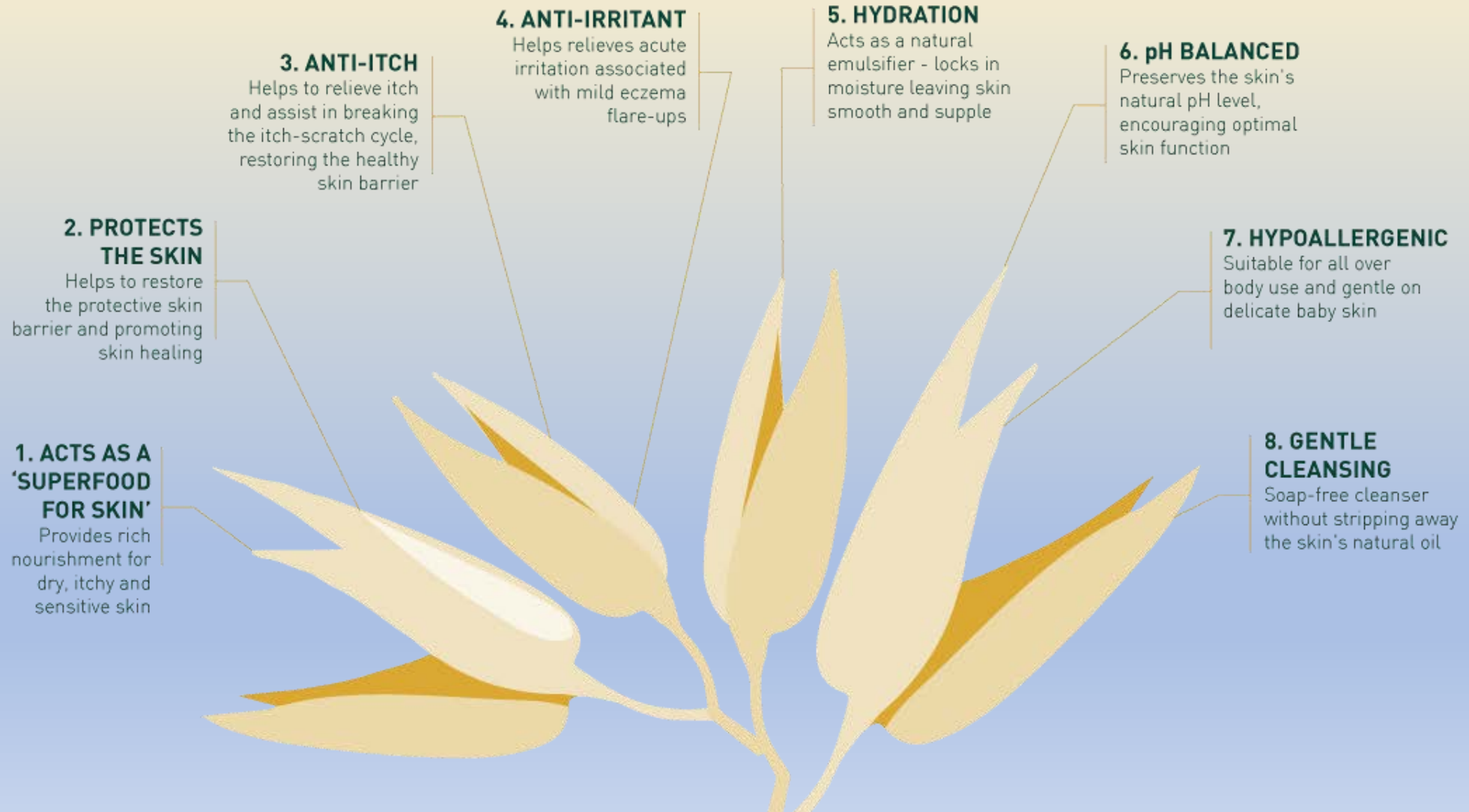
No *Elaeis Guineensis* (Palm) Oil or its derivatives are used in the manufacture of our products



Oat Efficacy



Oats in Skincare Ingredient Efficacy



Oats in Skincare

Oat Molecules



Avenanthramides

Anti-irritant, redness reduction and anti-oxidant activity.



Avenacins

Anti-inflammatory and immuno-regulatory properties.



Flavonoids

Anti-oxidant and anti-microbial activity.



Phenolics

Anti-oxidants, prevention of lipid peroxidation, anti-inflammatory.



-Glucan

Skin moisturiser and wound healing. Reduces lines and wrinkles.



Lipids & Oils

65% triglyceride content rich in Vitamin E and phospholipids.



Starch

Absorption properties and physical barrier former.

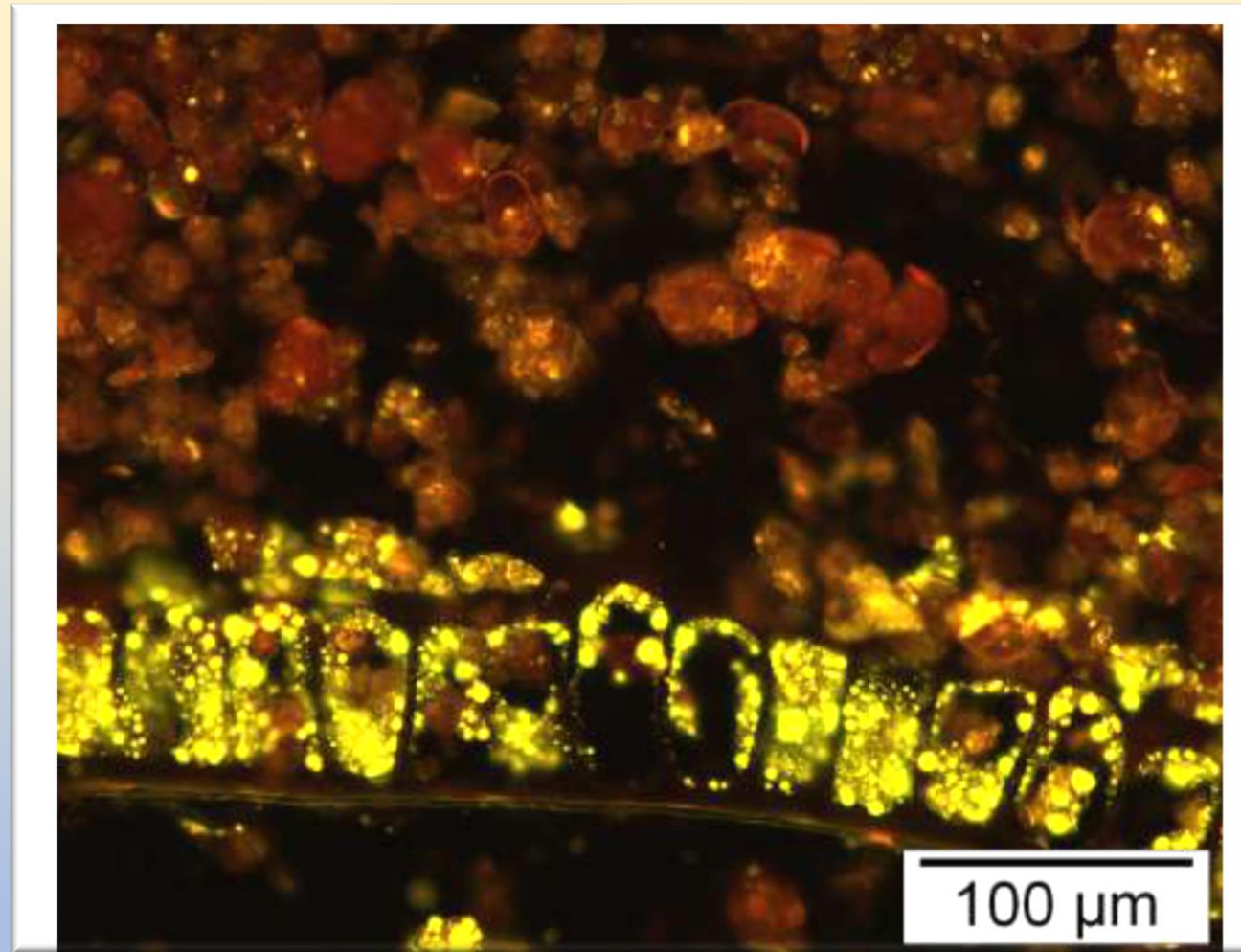


Peptides

Collagen and elastin promoters maintain barrier integrity.

Oats in Skincare

Oat Lipids



Oil droplets (bright/yellow) in oat aleurone layer cells visualised by staining with Nile Blue in cryo sections of oat grains. Microscopy image by courtesy of VTT Technical Research Centre of Finland Ltd.

Oats in Skincare

Oat Lipids



Phospholipids	Percentage
Phosphatidylcholine (PC)	6.0
Phosphatidylinositol (PI)	3.5
Phosphatidylethanolamine (PE)	3.0
Phosphatidic acid/Phosphatidylglycerol/cardiolipin (PG)	1.5
Lysophosphatidylcholine	1.0
Total Phospholipids	15.0%

Why Are Phospholipids Important?



Skin Protection

Phosphatidylcholine can improve and protect cells and membrane damaged by free radicals.



Transport Molecules

Phospholipids help to transport important molecules across cell membranes.

Oats in Skincare

Oat Lipids



Ceramide Class	AvenaPLex Skin Identical (%)	AvenaPLex Total incl. Isomers (%)
Non-hydroxy-sphingosine [NS]	0.07	0.52
Non-hydroxy-phytosphingosine [NP]	0.13	0.13
Omegahydroxy-6-hydroxy-sphingosine [EOH]	0.47	0.47
Alphahydroxy-sphingosine [AS]	0.05	0.19
Alphahydroxy-phytosphingosine [AP]	0.05	0.05
Total	0.78	1.36

Why Are Ceramides Important?



Skin Barrier

Ceramides form part of the skin's barrier which works to prevent excessive water loss and protect the skin from external aggressors.



Anti-Ageing

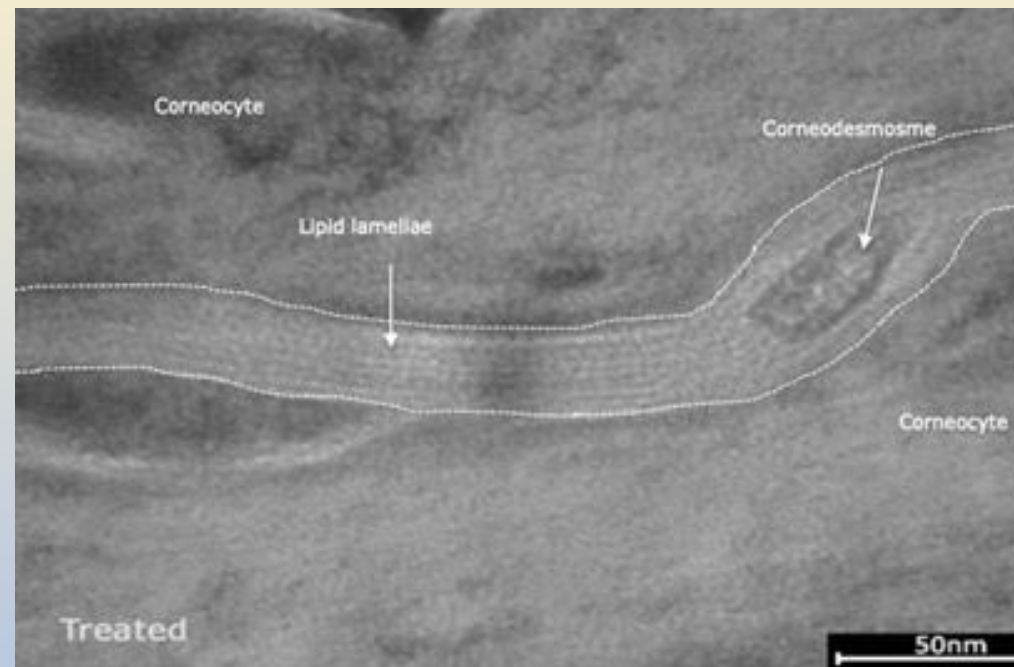
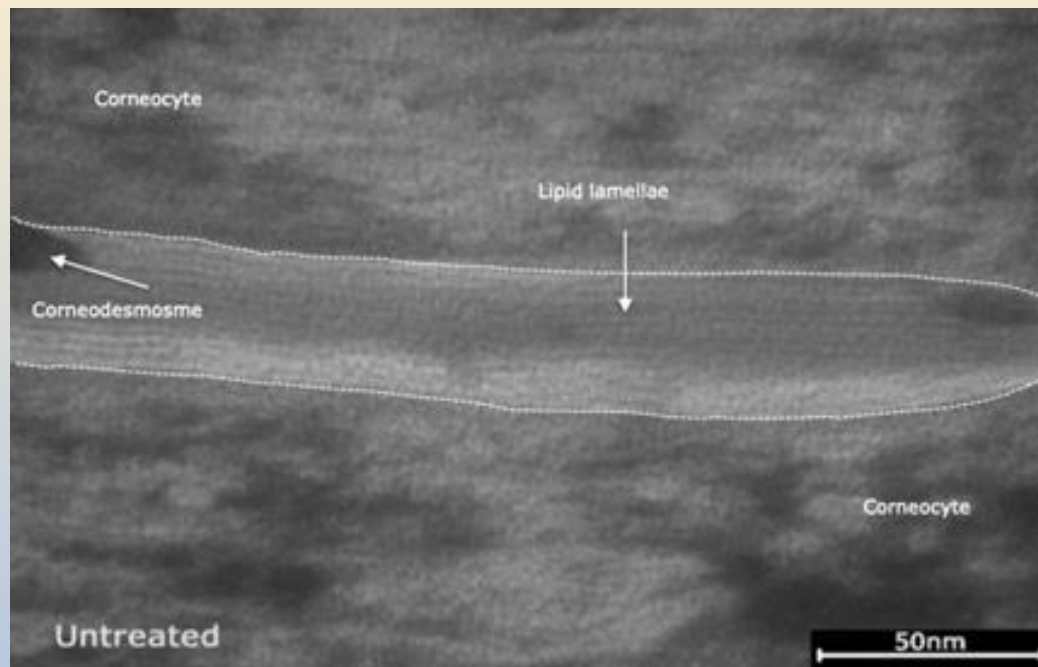
By replenishing ceramides lost through ageing, skin is able to fortify itself and retain optimal moisture for a firmer, smoother look.

Oats in Skincare

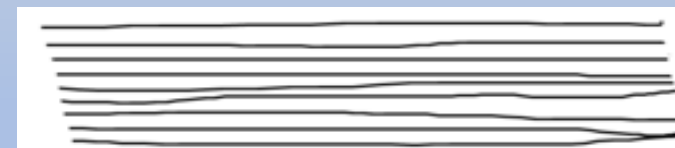
Oat Lipids



TEM Images of the ICLL in the Intercellular Space in the Stratum Corneum, at 8 Weeks



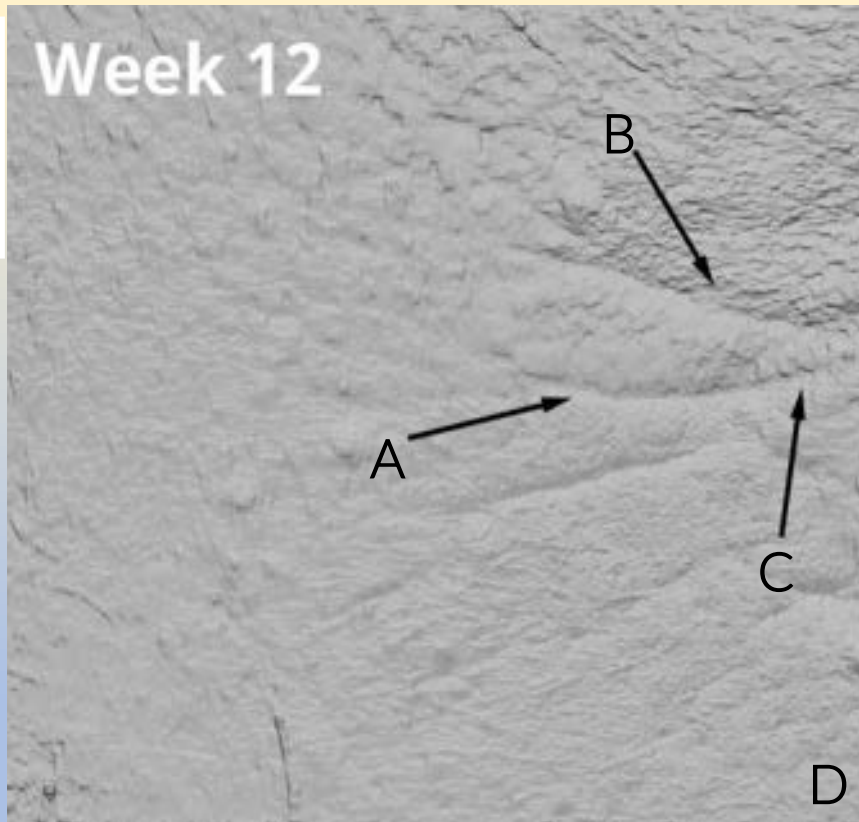
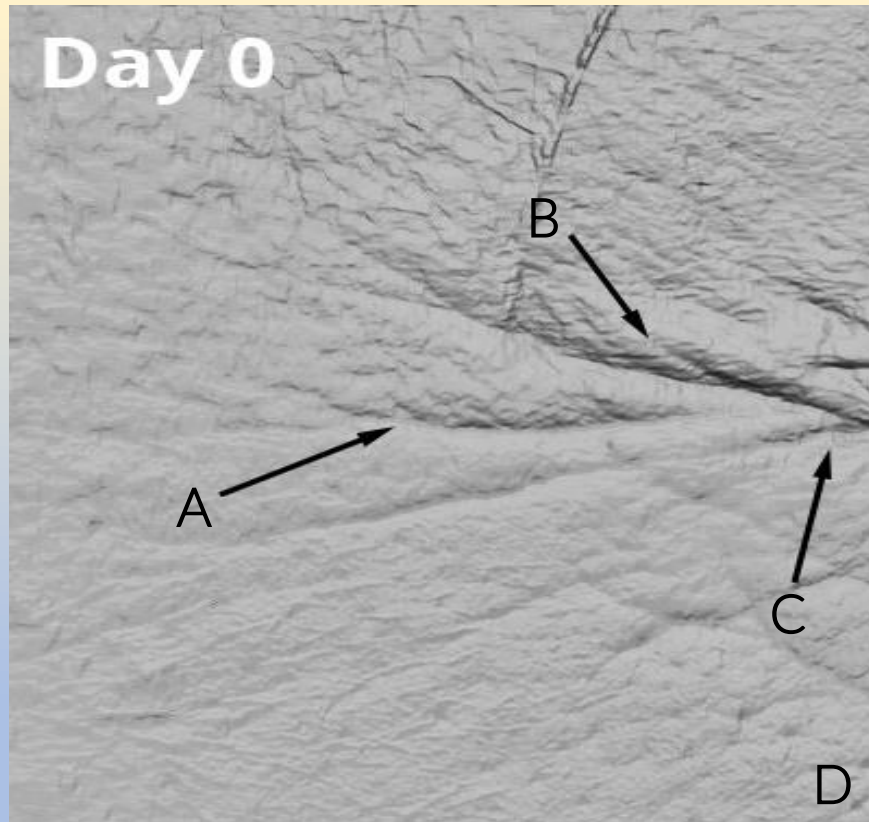
Untreated nICLL: 204



Treated with 1% AvenaPlex nICLL: 231

Oats in Skincare

Oat Lipids



VISIBLE DIFFERENCE

Wrinkles A, B, C

- Depth of wrinkle decreases
- Length of wrinkle decreases

Surface D

- Surrounding area of skin is visibly smoother

PRIMOS-CR Images with **AvenaPLex Facial Serum**

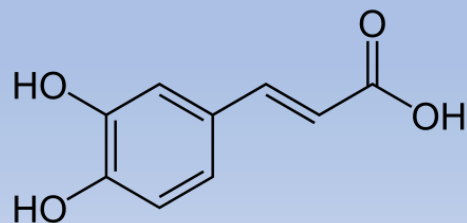
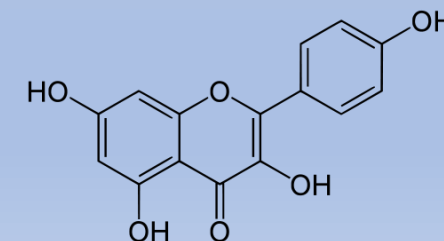
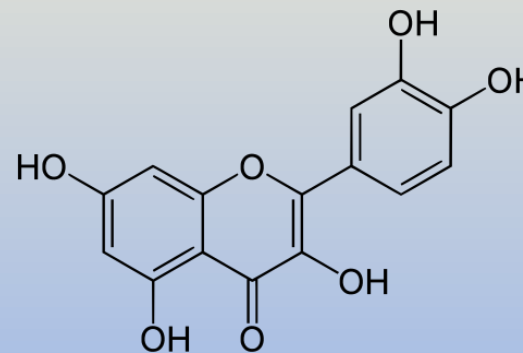
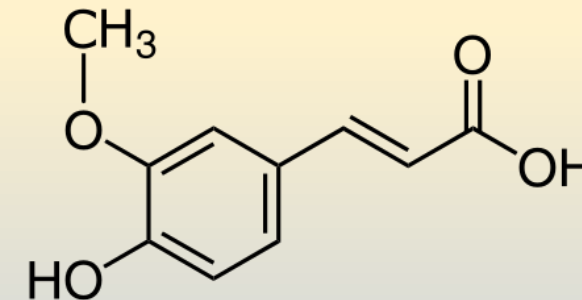
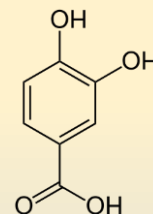
At Day 0 (Before Treatment) and At Week 12

Oats in Skincare

Oat Antioxidants



- Avenanthramides
- Ferulic acid
- Caffeic acid
- Protocatechuic acid
- Flavonoids - Quercetin and Kaempferol

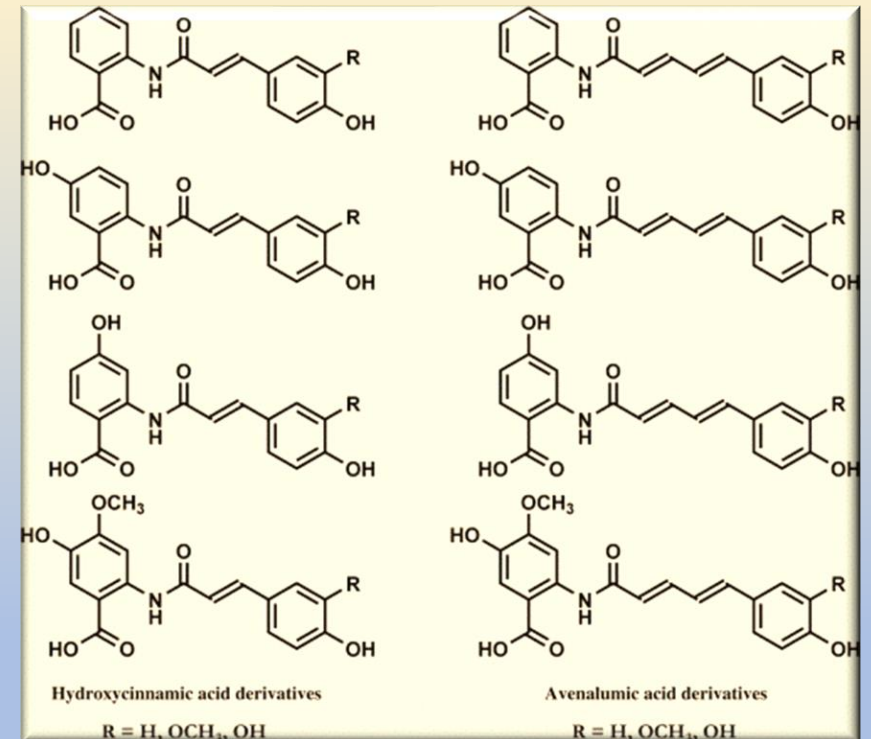


Oats in Skincare

Avenanthramides



- **Anti-inflammatory:** AV's have been shown to have potent anti-inflammatory effects, which can help to reduce redness and inflammation in the skin.
- **Antioxidant:** AV's have also been shown to have antioxidant properties, which can help to protect the skin from damage caused by free radicals.
- **Moisturising :** AV's have been shown to have moisturizing effects on the skin, which can help to hydrate and protect the skin.
- **Anti-pruritic :** AV's have also been shown to have anti-itch effects, which can help to relieve itching and discomfort in the skin.

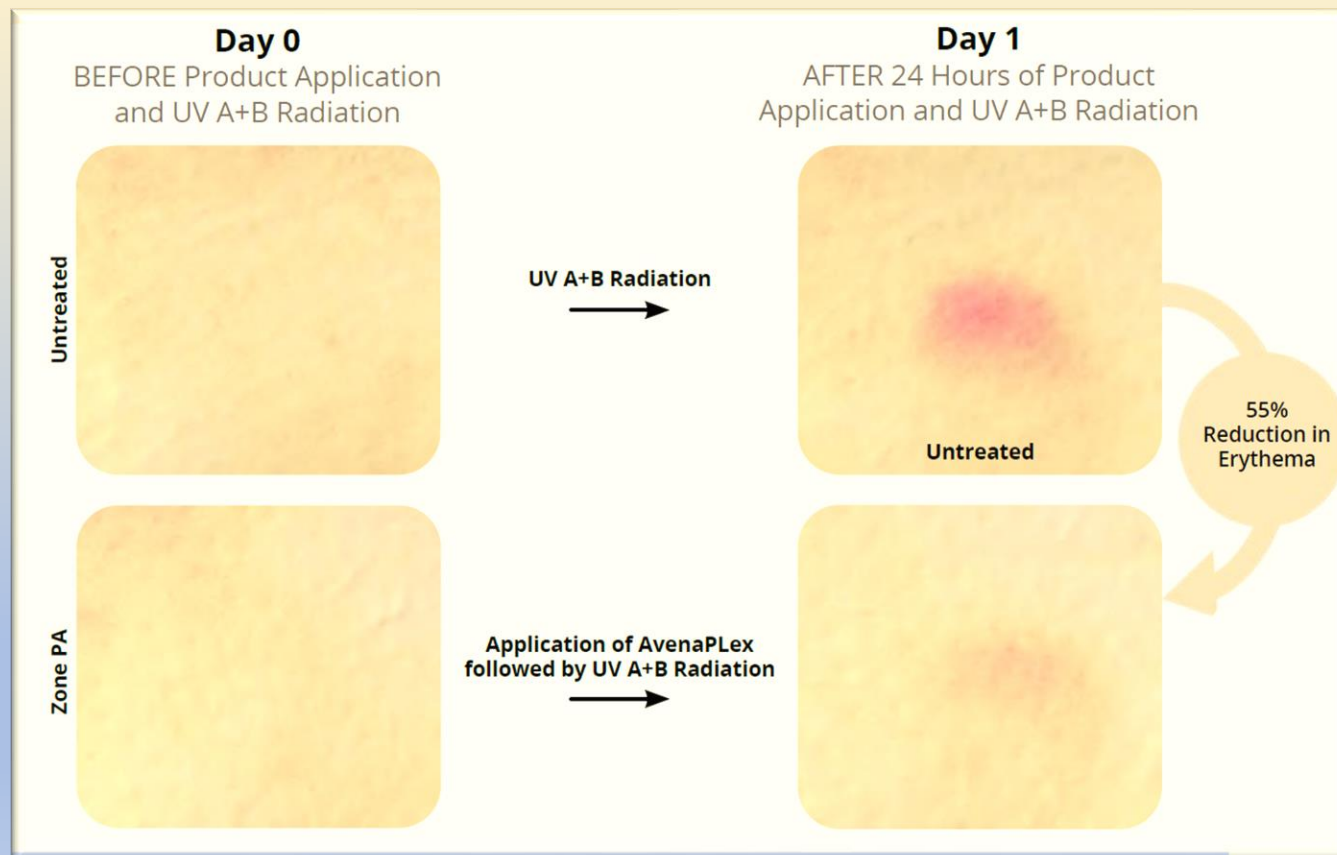


Oats in Skincare

Oat Antioxidants

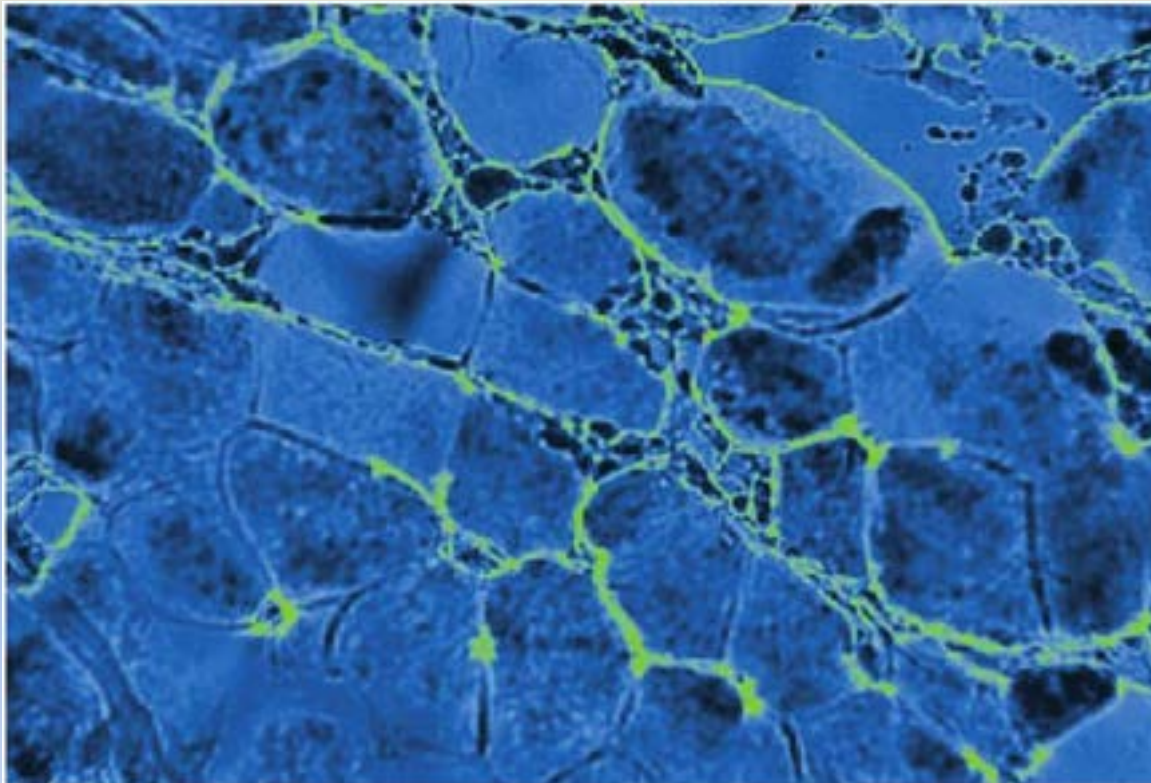
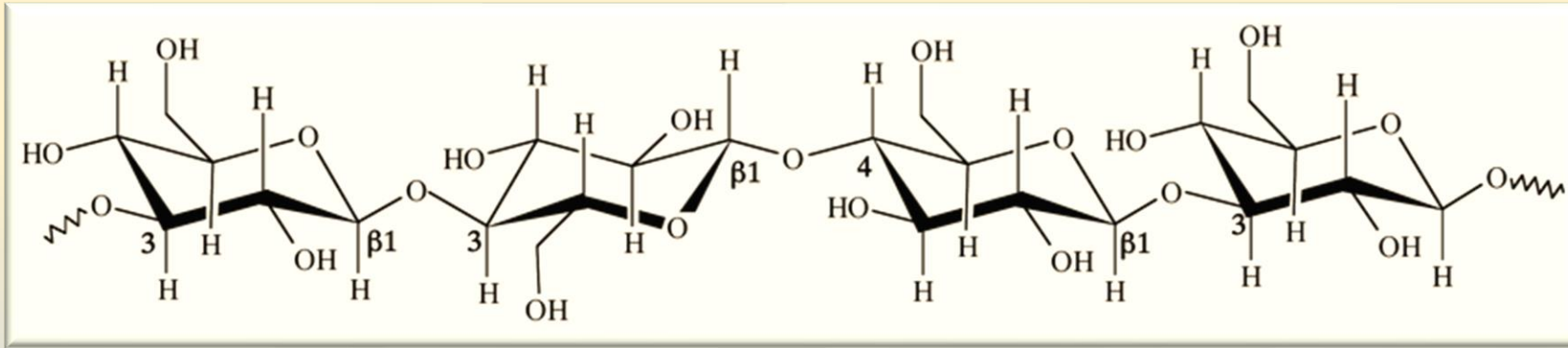


Visual Assessment of skin redness (with *avena sativa* kernel extract)



Oats in Skincare

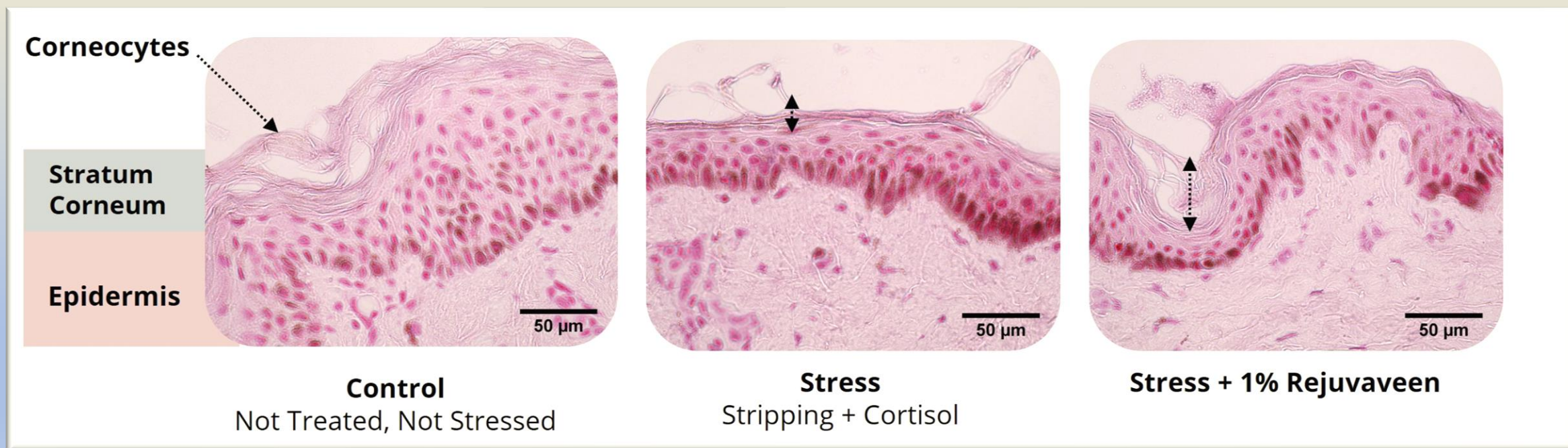
Oat β -Glucan



Migration of β -Glucan through the SC

High magnification photograph of epidermis skin section treated with a 0.05% (w/w) solution of beta-glucan. Note that beta-glucan staining is associated with the inter-cellular matrix indicating that the beta-glucan permeates the skin by passing between cells rather than passing through cells directly (magnification x250).

-Glucan effect on Corneocyte layers



In situ Visualisation of Number of Corneocytes Layers (40x Objective)

Conclusions



Thank You



Angus Robertson MBA, Head of Sales

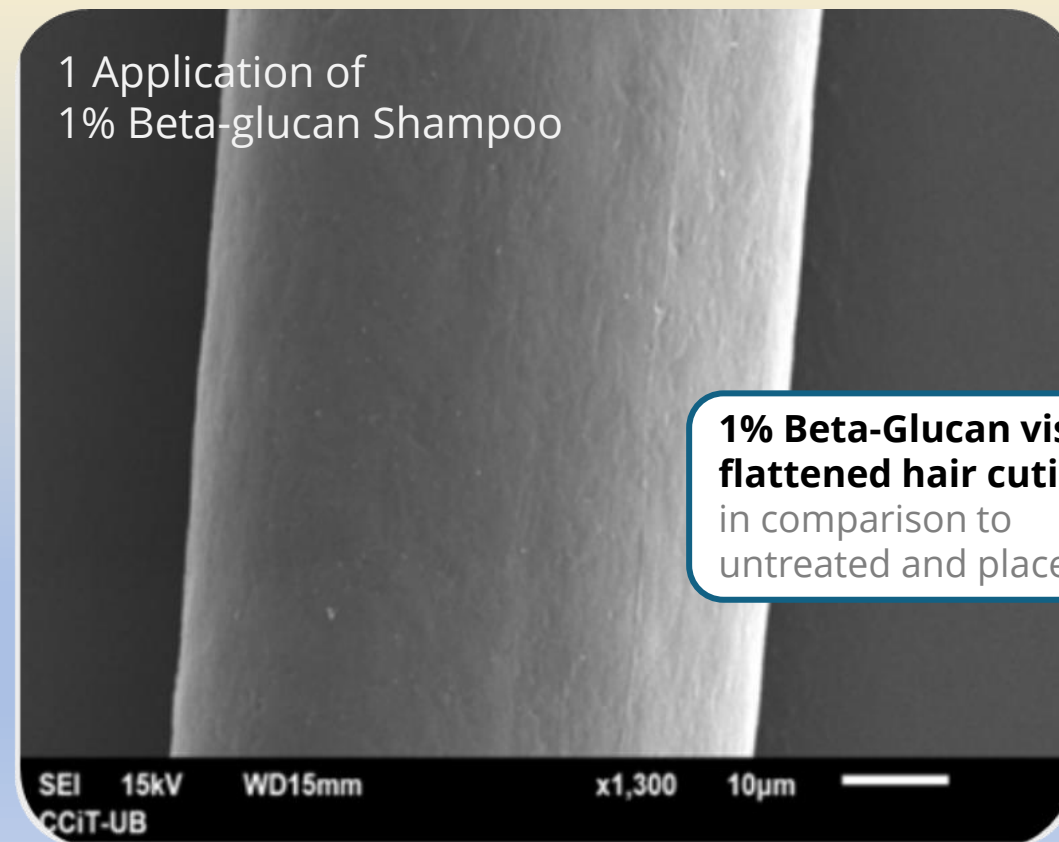
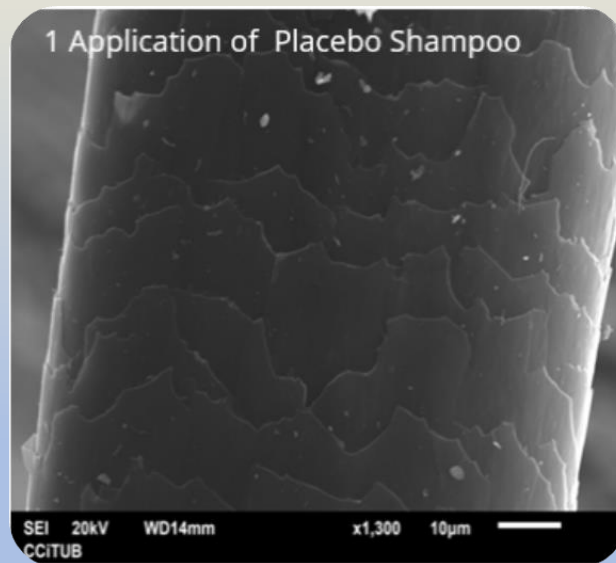
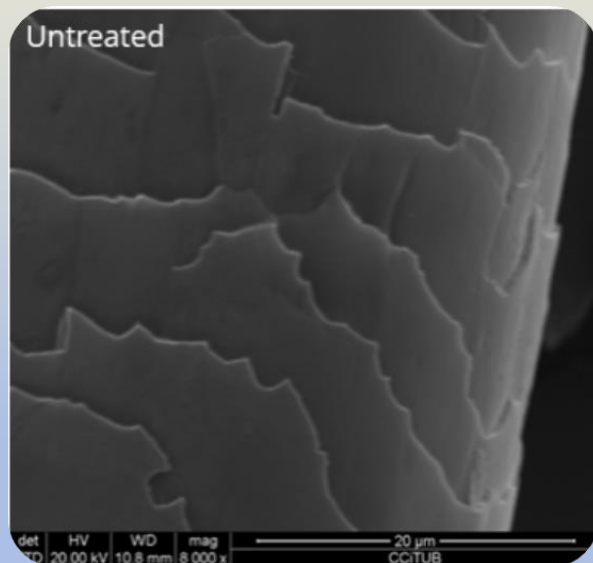
Email: ar@oat.co.uk

Telephone: +44 (0) 2380 767 228



Rinse-off Effect Of -Glucan

After Single Application



1% Beta-Glucan visibly flattened hair cuticles
in comparison to untreated and placebo

Type 1: Straight

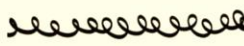
Oats in Skincare

Oat -Glucan



175%** Higher performance in hair strength protection effect with 1% Glucaveen conditioner compared to placebo


Type 3: Curly


Type 4: Coily

